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Applicant

ICOS CORPORATION et al

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(74) Agent: NAPOLI, James, J.; Marshall, Gerstein & Borun LLP, 233 S. Wacker Drive, Suite 6300, Sears Tower, Chicago, IL 60606-6357 (US).

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(71) Applicant (for all designated States except US): ICOS CORPORATION [US/US]; 22021 20th Avenue S.E., Bothell, WA 98021 (US).

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(54) Title: XANTHONES, THIOXANTHONES AND ACRIDINONES AS DNA-PK INHIBITORS

(57) Abstract: Compound that inhibit DNA-dependent protein kinase, compositions comprising the compounds, methods of inhibiting the DNA-PK biological activity, methods of sensitizing cells to the agents that cause DNA lesions, and methods of potentiating cancer treatment are disclosed.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7	C07D311/86	C07D405/04	C07D219/06	C07D219/16	C07D401/06
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BEILSTEIN Data, EMBASE, BIOSIS, CHEM ABS Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/20500 A (ICOS CORP) 14 March 2002 (2002-03-14)	1-8, 11-21, 23-45
A	claim 1 ---	9,10,22
X	ABADI ASHRAF H ET AL: "Synthesis, antitumor and antitubercular evaluation of certain new xanthenone and acridinone analogs" ARZNEIMITTEL-FORSCHUNG, vol. 49, no. 3, March 1999 (1999-03), pages 259-266, XP002296342 ISSN: 0004-4172 page 263 ---	1-8, 11-19, 23-45

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Steendijk, M

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92/16517 A (XENOVA LTD) 1 October 1992 (1992-10-01) claim 1 ----	1-8, 11-19, 23-45
X	MARI STEFANIA ET AL: "Flavone and xanthone derivatives related to fluoroquinolones" FARMACO (LAUSANNE), vol. 54, no. 6, 30 June 1999 (1999-06-30), pages 411-415, XP002296343 ISSN: 0014-827X page 412 -page 413 ----	1-8, 11-19, 23
X	DE 31 41 970 A (VNII LEKARSTVENNYCH RASTENIJ V) 5 May 1983 (1983-05-05) claim 1 ----	1-8, 11-19, 23
X	WO 96/16632 A (ROBIN JEAN RENAUD ; ROCHER YVES BIOLOG VEGETALE (FR); ROUILLARD FRANCO) 6 June 1996 (1996-06-06) claim 1 ----	1-8, 11-19, 23
X	DATABASE CAPLUS 'Online! STN; 1989 KLOPMAN ET AL.: "An artificial intelligence approach..." Database accession no. 1989:150323 XP002296348 see TRN: 119427-89-3, 119427-90-6 abstract & MOLECULAR PHARMACOLOGY, vol. 34, no. 6, 1988, pages 852-862, ----	1-8, 11-19, 23
X	WO 01/17985 A (VALENTI PIERO ; INDENA SPA (IT); BOMBARDELLI EZIO (IT)) 15 March 2001 (2001-03-15) claim 1 ----	11-19, 23-45
X	US 2001/027210 A1 (WILSON WILLIAM R) 4 October 2001 (2001-10-04) column 1 ----	11-19, 23-45
X	GHOSH CHANDRA KANTA ET AL: "Benzopyrans: Part 30. Synthesis of substituted xanthones from 3-acyl-2-methylbenzopyran-4-ones" TETRAHEDRON, vol. 49, no. 19, 1993, pages 4127-4134, XP002296344 ISSN: 0040-4020 page 4128 ----	1-9
		-/-

INTERNATIONAL SEARCH REPORT

tional Application No
PCT/US2004/008459

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE CAPLUS 'Online! STN; 2002 XUAN ET AL.: "Two new O and C-glycosylxanthones..." Database accession no. 2002:80848 XP002296349 see RN: 400759-79-7 abstract & GAODEN XUEXIAO HUAXUE XUEBAO, vol. 22, no. 10, supp., 2001, pages 148-150; ---	1-9
X	FONTENEAU NADIA ET AL: "Synthesis of quinone and xanthone analogs of rhein" TETRAHEDRON, vol. 57, no. 44, 29 October 2001 (2001-10-29), pages 9131-9135, XP002296345 ISSN: 0040-4020 page 9133	1-9
X	DATABASE CAPLUS 'Online! STN; 1973 AGASIMUNDIN ET AL.: "Furano compounds..." Database accession no. 1973:124471 XP002296350 see RN: 41534-30-9 abstract & JOURNAL FUER PRAKTISCHE CHEMIE, vol. 314, no. 3-4, 1972, pages 507-514, ---	11-21
X	DATABASE CAPLUS 'Online! STN; 1969 GOUD ET AL.: "Furan compounds. XVI" Database accession no. 1969:96661 XP002296351 see RN: 22315-95-3 abstract & MONATSH. CHEM., vol. 100, no. 1, 1969, pages 38-41, ---	11-21
X	EP 0 471 516 A (ICI PLC) 19 February 1992 (1992-02-19) claim 1 ---	1-8, 11-19, 23-45
X	WO 90/14008 A (SLOAN KETTERING INST CANCER) 29 November 1990 (1990-11-29) claim 1 ---	11-19, 23-45
		-/-

INTERNATIONAL SEARCH REPORT

Int'l. Application No.
PCT/US2004/008459

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 12, 29 October 1999 (1999-10-29) -& JP 11 199565 A (TOYAMA CHEM CO LTD), 27 July 1999 (1999-07-27) abstract ---	1-8, 11-19, 23
X	TABARRINI ORIANA ET AL: "Design and synthesis of modified quinolones as antitumoral acridones" JOURNAL OF MEDICINAL CHEMISTRY, vol. 42, no. 12, 17 June 1999 (1999-06-17), pages 2136-2144, XP002296346 ISSN: 0022-2623 page 2139; table 1 ---	1-8, 11-19, 23-45
X	FUJIOKA H ET AL: "Activities of new acridone alkaloid derivatives against Plasmodium yoelii in vitro" ARZNEIMITTEL-FORSCHUNG/DRUG RESEARCH 1990 GERMANY, vol. 40, no. 9, 1990, pages 1026-1029, XP002296347 ISSN: 0004-4172 page 1027; table 1 ---	1-8, 11-19, 23
X	US 4 539 412 A (ARCHER SYDNEY) 3 September 1985 (1985-09-03) claim 1 ---	11-21, 23-45
X	CROISY-DELCEY ET AL.: "AZA ANALOGUES OF LUCANTHONE: SYNTHESIS AND ANTITUMOR AND BACTERICIDAL PROPERTIES" 1 September 1983 (1983-09-01) , JOURNAL OF MEDICINAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY. WASHINGTON, US, PAGE(S) 1329-1333 XP000561937 ISSN: 0022-2623 page 1330 -page 1331 ---	11-21, 23-45
X	US 3 904 631 A (ELSLAGER EDWARD F ET AL) 9 September 1975 (1975-09-09) claim 1 ---	1-8, 11-19, 23
		-/-

INTERNATIONAL SEARCH REPORT

In: ional Application No
PCT/US2004/008459

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HARFENIST M ET AL: "SELECTIVE INHIBITORS OF MONOAMINE OXIDASE. 3. STRUCTURE-ACTIVITY RELATIONSHIP OF TRICYCLICS BEARING IMIDAZOLINE, OXADIAZOLE, OR TETRAZOLE GROUPS" JOURNAL OF MEDICINAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY. WASHINGTON, US, vol. 39, no. 9, 1996, pages 1857-1863, XP001097214 ISSN: 0022-2623 the whole document -----	1, 3-8, 11-19, 23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US2004/008459

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
WO 0220500	A 14-03-2002	AU EP WO US	8843201 A 1351946 A2 0220500 A2 2002165218 A1	22-03-2002 15-10-2003 14-03-2002 07-11-2002
WO 9216517	A 01-10-1992	EP WO GB JP	0580609 A1 9216517 A1 2269382 A ,B 6506202 T	02-02-1994 01-10-1992 09-02-1994 14-07-1994
DE 3141970	A 05-05-1983	GB DE	2108383 A ,B 3141970 A1	18-05-1983 05-05-1983
WO 9616632	A 06-06-1996	FR FR FR AT AU CA DE DE EP WO JP JP NO PL US	2727313 A1 2731906 A1 2735695 A1 206611 T 4264396 A 2180745 A1 69523169 D1 69523169 T2 0793476 A1 9616632 A1 2858961 B2 9506906 T 963053 A 315636 A1 5824320 A	31-05-1996 27-09-1996 27-12-1996 15-10-2001 19-06-1996 06-06-1996 15-11-2001 16-05-2002 10-09-1997 06-06-1996 17-02-1999 08-07-1997 20-09-1996 25-11-1996 20-10-1998
WO 0117985	A 15-03-2001	AT AU AU CA CN CZ DE DE DK WO EP ES HK HU JP NO PL PT SI SK US	236147 T 775790 B2 7000000 A 2382129 A1 1371371 T 20020785 A3 60001974 D1 60001974 T2 1212312 T3 0117985 A1 1212312 A1 2195933 T3 1043368 A1 0202578 A2 2003508524 T 20021050 A 356699 A1 1212312 T 1212312 T1 3092002 A3 2002183318 A1	15-04-2003 12-08-2004 10-04-2001 15-03-2001 25-09-2002 12-06-2002 08-05-2003 19-02-2004 21-07-2003 15-03-2001 12-06-2002 16-12-2003 15-08-2003 28-11-2002 04-03-2003 03-05-2002 28-06-2004 29-08-2003 31-12-2003 07-10-2003 05-12-2002
US 2001027210	A1 04-10-2001	JP	2001247459 A	11-09-2001
EP 0471516	A 19-02-1992	AU CA CS EP FI	8142291 A 2048298 A1 9102510 A3 0471516 A1 913893 A	20-02-1992 17-02-1992 18-03-1992 19-02-1992 17-02-1992

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US2004/008459

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0471516	A	HU 58293 A2 IE 912616 A1 JP 4257563 A MX 9100703 A1 NO 913187 A PT 98680 A ZA 9105937 A	28-02-1992 26-02-1992 11-09-1992 01-04-1992 17-02-1992 31-08-1992 29-04-1992
WO 9014008	A 29-11-1990	AU 5831090 A US 5340818 A WO 9014008 A1	18-12-1990 23-08-1994 29-11-1990
JP 11199565	A 27-07-1999	NONE	
US 4539412	A 03-09-1985	NONE	
US 3904631	A 09-09-1975	GB 1434878 A PH 10283 A	05-05-1976 05-11-1976

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